

# CLUTCH

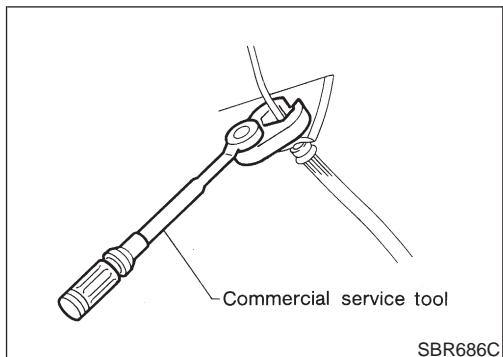
## SECTION CL

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## PRECAUTIONS

### Precautions



### Precautions

- Recommended fluid is brake fluid “DOT 3” or “DOT 4”. Refer to *MA-13, “Fluid and Lubricant”*.
- Never reuse drained brake fluid.
- Be careful not to splash brake fluid on painted areas.
- When removing and installing clutch piping, use Tool.
- Use new brake fluid to clean or wash all parts of master cylinder, operating cylinder and clutch damper.
- Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.

### **WARNING:**

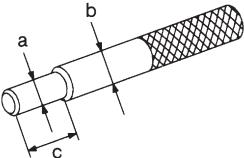
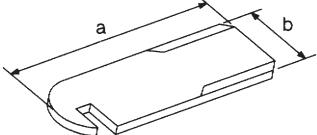
After cleaning clutch disc, wipe it with a dust collector. Do not use compressed air.

## PREPARATION

Special Service Tools

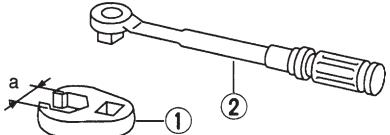
### Special Service Tools

NFCL0002

Tool number Tool name	Description	
ST20630000 Clutch aligning bar	 <p>NT405</p>	<p>Installing clutch cover and clutch disc</p> <p>a: 15.8 mm (0.622 in) dia. b: 22.9 mm (0.902 in) dia. c: 45.0 mm (1.772 in)</p>
ST20050240 Diaphragm spring adjusting wrench	 <p>NT404</p>	<p>Adjusting unevenness of diaphragm spring of clutch cover</p> <p>a: 150 mm (5.91 in) b: 25 mm (0.98 in)</p>

### Commercial Service Tools

NFCL0003

Tool name	Description	
1 Flare nut crowfoot 2 Torque wrench	 <p>NT360</p>	<p>Removing and installing clutch piping</p> <p>a: 10 mm (0.39 in)</p>

# NOISE, VIBRATION AND HARSHNESS (NVH) TROUBLESHOOTING

NFCL0004

NVH

## NVH Troubleshooting Chart

NFCL0004S01

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

### CLUTCH

NFCL0004S0101

SUSPECTED PARTS (Possible cause)		Reference page																	
		CLUTCH PEDAL (Free play out of adjustment)	CLUTCH LINE (Air in line)	MASTER CYLINDER PISTON CUP (Damaged)	OPERATING CYLINDER PISTON CUP (Damaged)	ENGINE MOUNTING (Loose)	RELEASE BEARING (Worn, dirty or damaged)	CLUTCH DISC (Out of true)	CLUTCH DISC (Runout is excessive)	CLUTCH DISC (Lining broken)	CLUTCH DISC (Dirty or burned)	CLUTCH DISC (Oily)	CLUTCH DISC (Worn out)	CLUTCH DISC (Hardened)	CLUTCH DISC (Lack of spline grease)	DIAPHRAGM SPRING (Damaged)	DIAPHRAGM SPRING (Out of tip alignment)	PRESSURE PLATE (Distortion)	FLYWHEEL (Distortion)
Symptom	Clutch grabs/chatters					1													
	Clutch pedal spongy		1	2	2														
	Clutch noisy					1													
	Clutch slips	1																	
	Clutch does not disengage	1	2	3	4		5	5	5	5	5	2	2	2	5	6	6	7	4

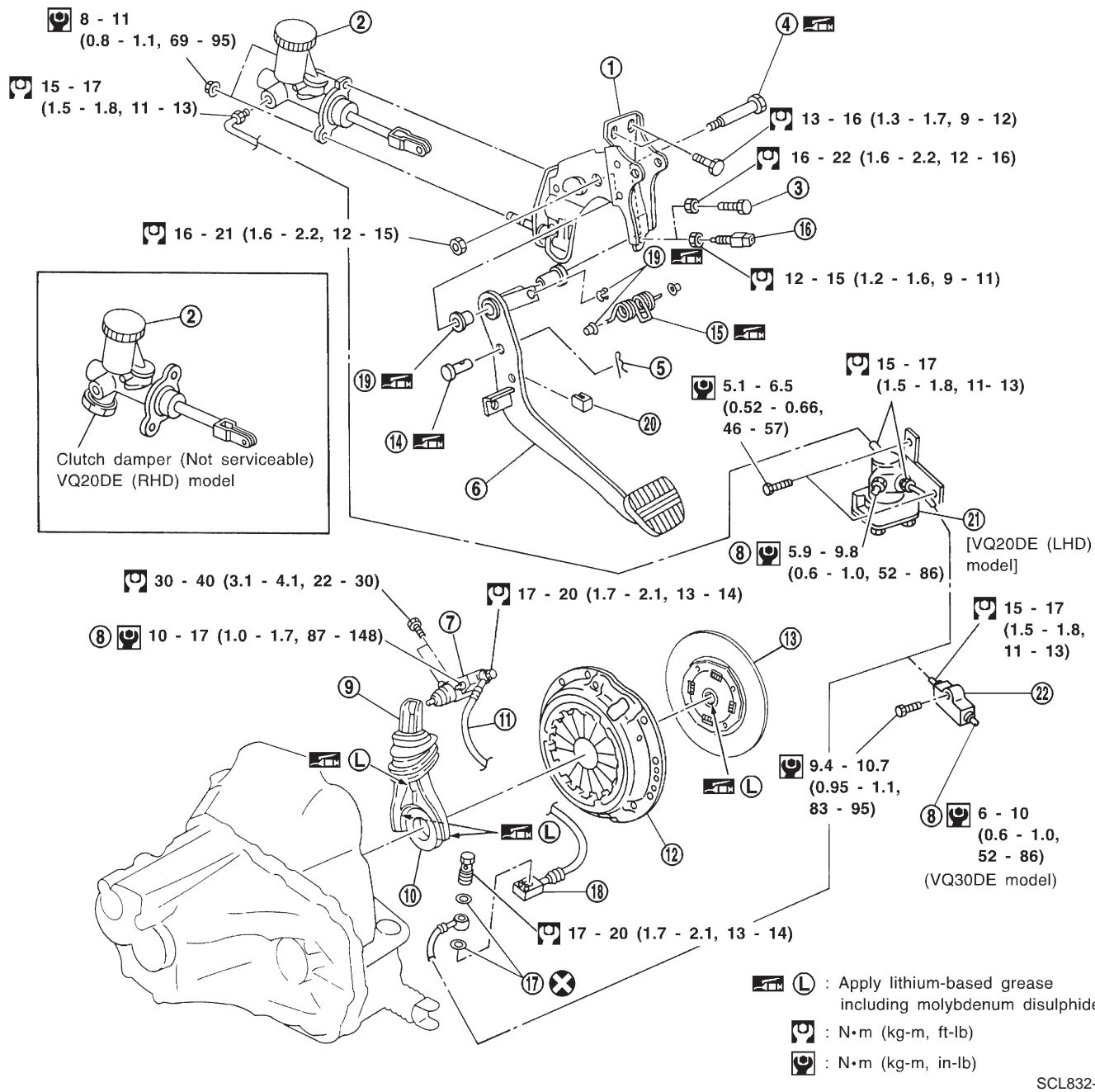
# CLUTCH SYSTEM

Components

## Components

NFCL0005

SEC. 300•305•306•465

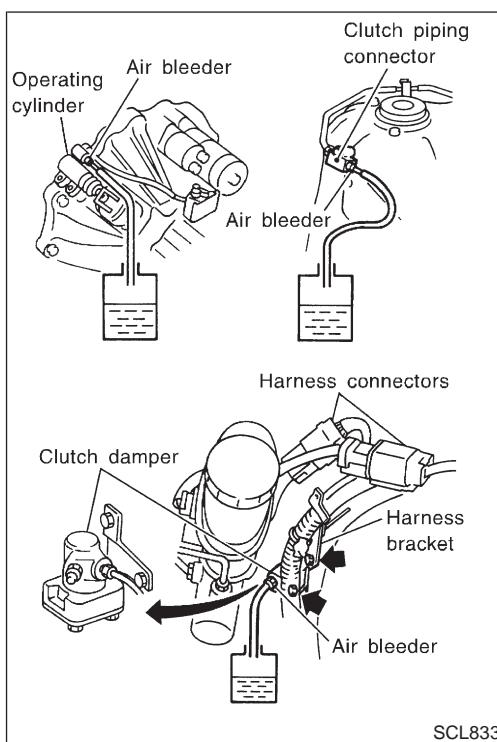
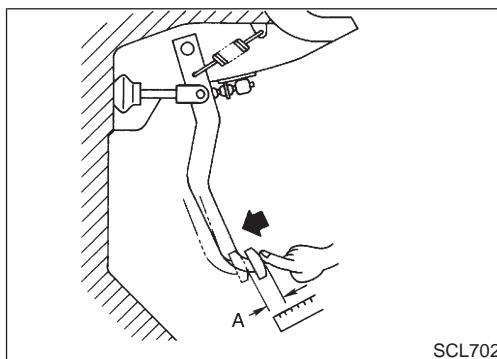
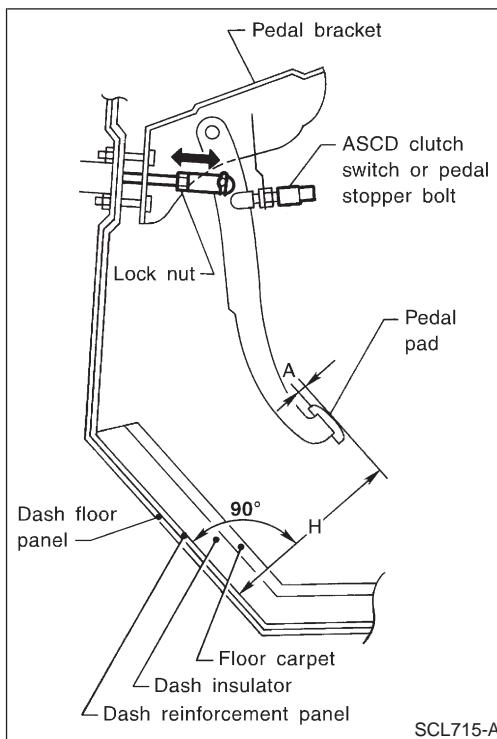


SCL832-A

1. Pedal bracket
2. Clutch master cylinder
3. Pedal stopper bolt
4. Fulcrum pin
5. Pin
6. Clutch pedal
7. Operating cylinder
8. Air bleeder valve
9. Withdrawal lever
10. Release bearing
11. Clutch hose
12. Clutch cover
13. Clutch disc
14. Clevis pin
15. Assist spring
16. ASCD clutch switch
17. Washer
18. Clutch hose connector
19. Bushing
20. Stopper rubber
21. Clutch damper
22. Clutch piping connector

# CLUTCH SYSTEM

## Inspection and Adjustment



## Inspection and Adjustment

### ADJUSTING CLUTCH PEDAL

NFCL0006

NFCL0006S01

#### Pedal Height

1. Adjust pedal height with ASCD clutch switch or pedal stopper bolt.

##### Pedal height "H":

LHD model:

179.5 - 189.5 mm (7.07 - 7.46 in)

RHD model:

193.5 - 203.5 mm (7.62 - 8.01 in)

2. Adjust pedal free play with master cylinder push rod. Then tighten lock nut.

##### Pedal free play "A":

9 - 16 mm (0.35 - 0.63 in)

- Push or step on clutch pedal until resistance is felt, and check the distance the pedal moves.

## AIR BLEEDING PROCEDURE

### VQ20DE (LHD) Model

NFCL0006S02

1. Bleed air from clutch damper according to the following procedure.
  - Carefully monitor fluid level at master cylinder during air bleeding operation.
  - Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
2. a. Top up reservoir of master cylinder with recommended brake fluid.
- b. Connect a transparent vinyl tube to air bleeder valve.
- c. Slowly depress clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 second intervals.
- d. Holding clutch pedal depressed, open air bleeder valve to release air.
- e. Close air bleeder valve.
- f. Release clutch pedal and wait at least 5 seconds.
- g. Repeat steps c through f above until brake fluid flows from air bleeder valve without air bubbles.

## CLUTCH SYSTEM

### Inspection and Adjustment (Cont'd)

2. Bleed air from clutch operating cylinder according to the above same procedure.
3. Repeat the above air bleeding procedures 1 and 2 several times.

**Tightening torque of air bleeder valve:**

Refer to "Components", CL-5.

### VQ20DE (RHD) Model

NFCL0006S0202

1. Bleed air from operating cylinder according to the following procedure.
  - **Carefully monitor fluid level at master cylinder during air bleeding operation.**
  - **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
  - a. Top up reservoir of master cylinder with recommended brake fluid.
  - b. Connect a transparent vinyl tube to air bleeder valve.
  - c. Slowly depress clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 second intervals.
  - d. Holding clutch pedal depressed, open air bleeder valve to release air.
  - e. Close air bleeder valve.
  - f. Release clutch pedal and wait at least 5 seconds.
  - g. Repeat steps c through f above until brake fluid flows from air bleeder valve without air bubbles.
2. Repeat the above air bleeding procedure several times.

**Tightening torque of air bleeder valve:**

Refer to "Components", CL-5.

### VQ30DE Model

NFCL0006S0203

1. Bleed air from clutch piping connector according to the following procedure.
  - **Carefully monitor fluid level at master cylinder during air bleeding operation.**
  - **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
  - a. Top up reservoir of master cylinder with recommended brake fluid.
  - b. Connect a transparent vinyl tube to air bleeder valve.
  - c. Slowly depress clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 second intervals.
  - d. Holding clutch pedal depressed, open air bleeder valve to release air.
  - e. Close air bleeder valve.
  - f. Release clutch pedal and wait at least 5 seconds.
  - g. Repeat steps c through f above until brake fluid flows from air bleeder valve without air bubbles.
2. Bleed air from clutch operating cylinder according to the above same procedure.
3. Repeat the above air bleeding procedures 1 and 2 several times.

**Tightening torque of air bleeder valve:**

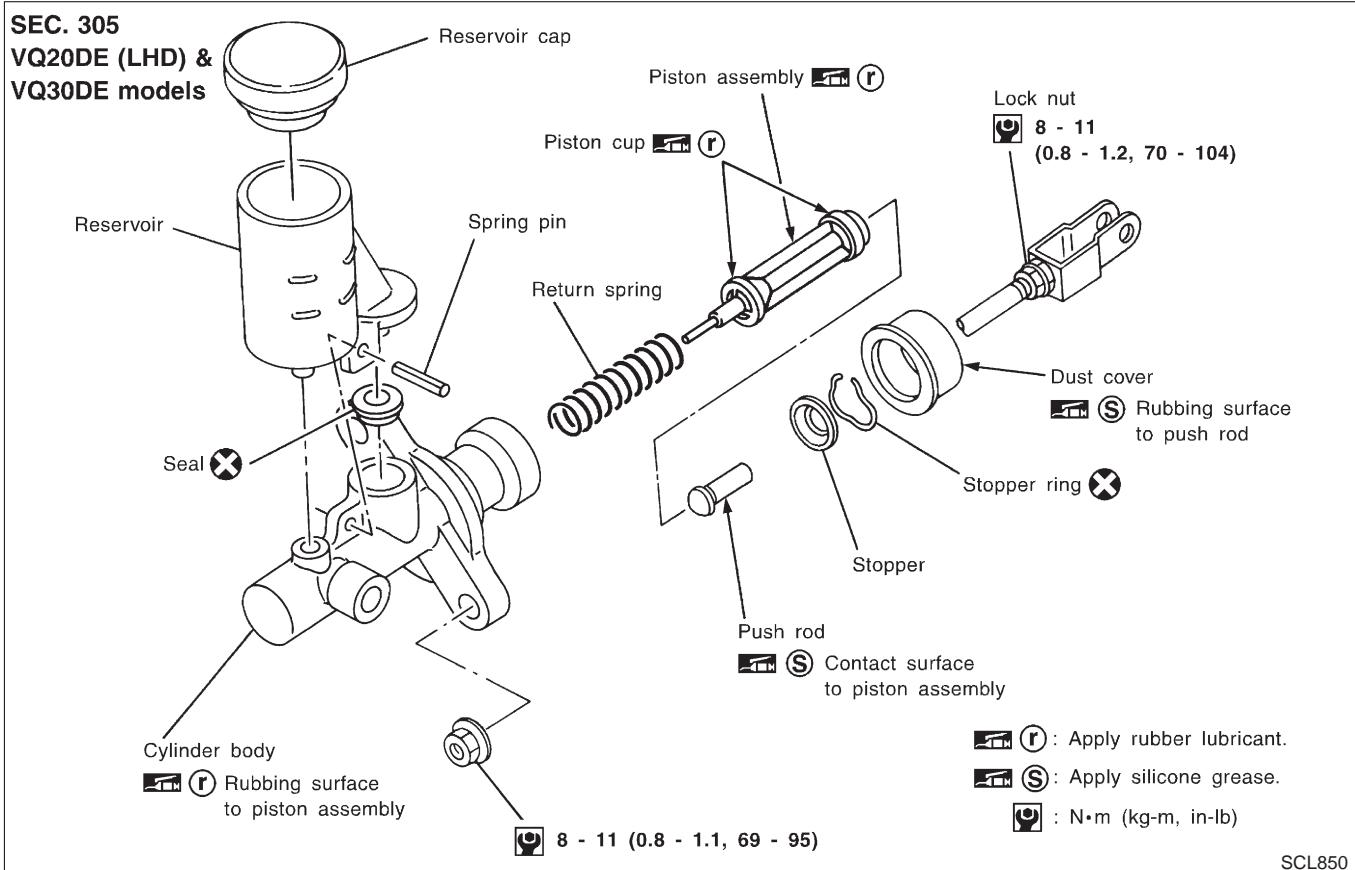
Refer to "Components", CL-5.

# CLUTCH MASTER CYLINDER

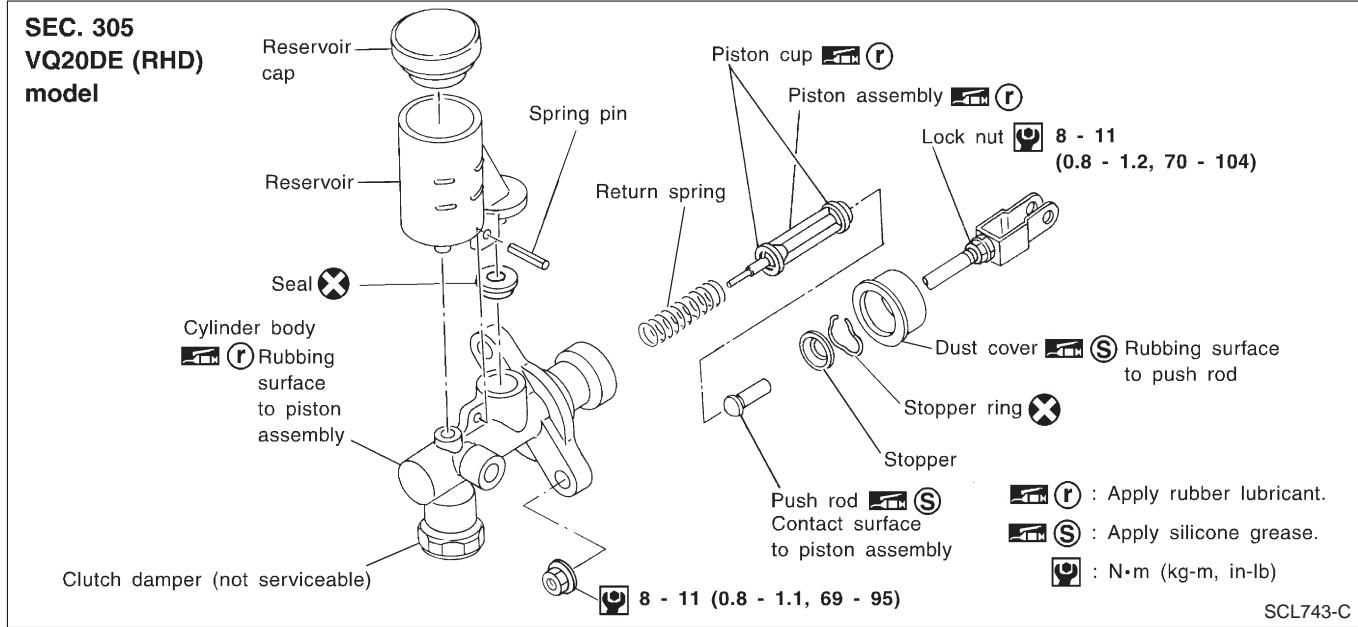
## Components

### Components

NFC10007



SCL850



# CLUTCH MASTER CYLINDER

Removal

## Removal

1. Drain brake fluid.

NFCLO008

### CAUTION:

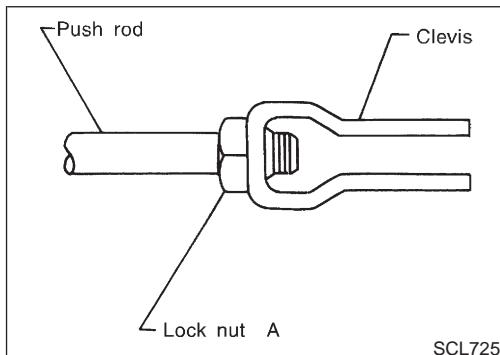
Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

2. Remove clutch tube using a flare nut wrench.
3. Remove snap pin between clutch pedal and push rod, and remove clevis pin.
4. Unscrew master cylinder assembly mounting nuts and remove master cylinder assembly from vehicle.

## Installation

NFCLO009

1. Connect clutch tube to master cylinder assembly, and hand-tighten flare nut.
2. Install master cylinder assembly to vehicle, and tighten mounting nuts to the specified torque.  
 : 8 - 11 N·m (0.8 - 1.1 kg·m, 69 - 95 in-lb)
3. Tighten clutch tube flare nut using a flare nut torque wrench.  
 : 15 - 18 N·m (1.5 - 1.8 kg·m, 11 - 13 ft-lb)
4. After installing clevis pin, install snap pin to connect clutch pedal to push rod.
5. After finishing the operation, bleed air from clutch piping connector and operating cylinder. (Refer to "Air Bleeding Procedure", CL-6.)



## Disassembly

NFCLO010

1. Loosen push rod lock nut A to remove clevis and lock nut A.
2. Remove dust cover.
3. Remove stopper ring and stopper, and remove push rod from cylinder body. During removal, keep push rod depressed, to prevent piston inside master cylinder from popping out.
4. Remove piston assembly from cylinder body.

## Inspection

NFCLO011

Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Return spring, for wear or damage
- Dust cover, for cracks, deformation or damage
- Reservoir, for deformation or damage

## CLUTCH MASTER CYLINDER

### Assembly

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#### Assembly

NFCLO012

1. Apply rubber lubricant to the sliding part of piston assembly, and insert piston assembly.
2. After installing stopper to push rod, install stopper ring while keeping piston assembly depressed by hand, so that piston assembly will not pop out.

#### CAUTION:

**Stopper ring cannot be reused. Always use a new stopper ring for assembly.**

3. Install dust cover.
4. Install clevis to push rod, and tighten lock nut A to the specified torque.

 : 8 - 11 N·m (0.8 - 1.2 kg·m, 70 - 104 in-lb)

5. Install spring pin using a pin punch.

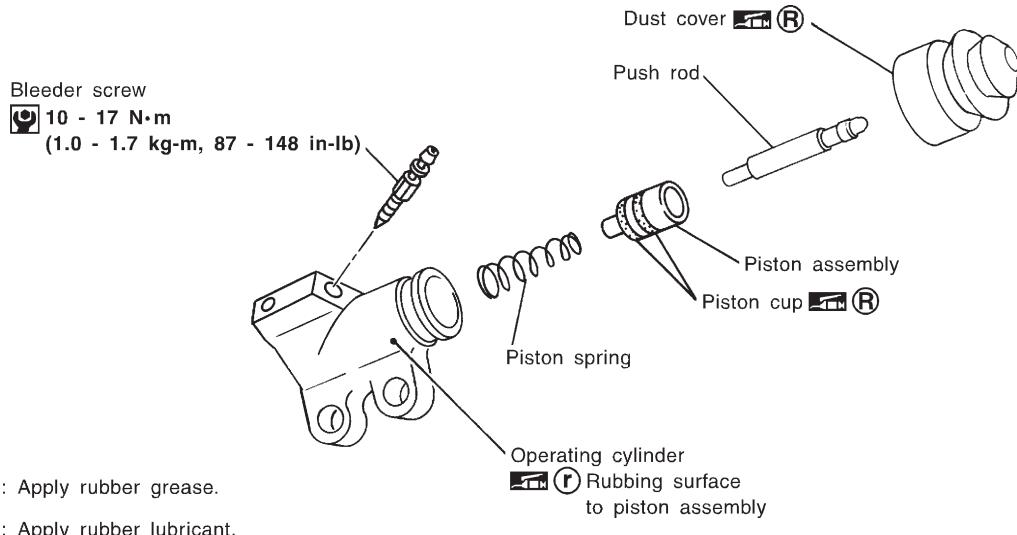
# OPERATING CYLINDER

Components

## Components

NFCLO019

SEC. 306



SCL813

## Removal

NFCLO020

1. Drain brake fluid.

### CAUTION:

Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

2. Remove union bolt and clutch hose from operating cylinder.
3. Remove operating cylinder mounting bolts, and remove cylinder from vehicle.

## Disassembly

NFCLO021

Remove dust cover, and remove piston assembly from cylinder body.

## Inspection

NFCLO022

Inspect for following, and replace parts if necessary.

- Damage, foreign material, wear, rust, and pinholes on the cylinder inner surface, piston, and sliding part of piston cup
- Weak spring
- Crack and deformation of dust cover

## OPERATING CYLINDER

### Assembly

---

#### Assembly

NFCLO023

1. Apply recommended rubber grease to piston cup and piston, and insert piston assembly.
2. Install dust cover.

#### Installation

NFCLO024  
Install the components in the reverse order of removal. Adhere to the operations described below.

##### CAUTION:

Install the hose without twisting it.

- The copper washer of the union bolt should not be reused. Always use a new copper washer for installation.
- After finishing the operation, bleed air from the clutch piping connector and operating cylinder. Refer to "Air Bleeding Procedure", CL-6.

# CLUTCH DAMPER

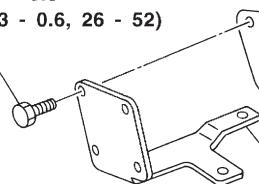
Components

## Components

NFCLO041

**SEC. 306**  
**VQ20DE (LHD) model**

 3.0 - 5.8  
(0.3 - 0.6, 26 - 52)



Damper rubber

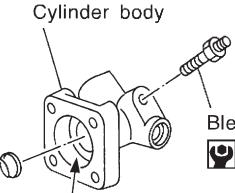
Plate

Gasket 

Damper cover

Cylinder body

Spring



Bleeder screw

 5.9 - 9.8  
(0.6 - 1.0, 52 - 86)

Rubbing surface  
to piston assembly

Piston cup 

  : Apply rubber lubricant.

 : N·m (kg·m, in·lb)

SCL851

## Inspection

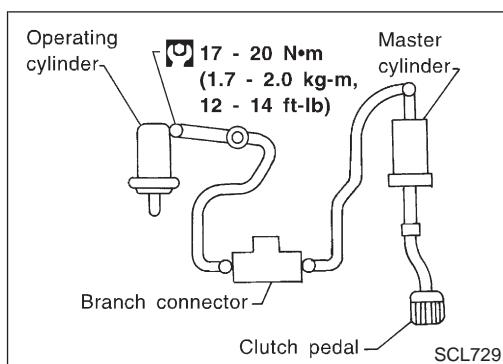
NFCLO042

Check the following items, and replace if necessary.

- Rubbing surface of cylinder and piston, for uneven wear, rust or damage
- Piston with piston cup, for wear or damage
- Damper rubber and plate for cracks, deformation or damage
- Piston spring, for wear or damage

# PIPING

## Removal



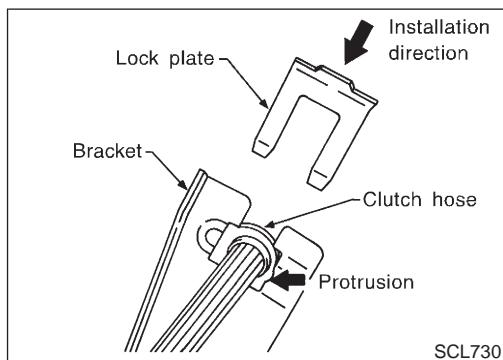
## Removal

1. Remove fuel filter mounting bracket.
2. Remove air cleaner and air duct. Refer to **EM-56**, "REMOVAL AND INSTALLATION".
3. Drain brake fluid.

**CAUTION:**  
Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

4. Remove flare nut using a flare nut wrench.
5. Remove clutch hose and clutch tube.

NFCLO025



## Installation

1. When installing clutch hose to bracket, face lock plate in the correct direction as shown to secure clutch hose.

NFCLO026

**CAUTION:**

Install clutch hose without twisting or bending it.

2. Tighten flare nut to the specified torque, using a flare nut wrench.

 : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

**CAUTION:**

Be careful not to damage flare nut and clutch tube.

3. Install clutch hose to operating cylinder, and tighten mounting bolts to the specified torque.

 : 17 - 20 N·m (1.7 - 2.1 kg-m, 13 - 14 ft-lb)

4. After finishing the operation, bleed air from the clutch piping connector and operating cylinder. Refer to "Air Bleeding Procedure", CL-6.

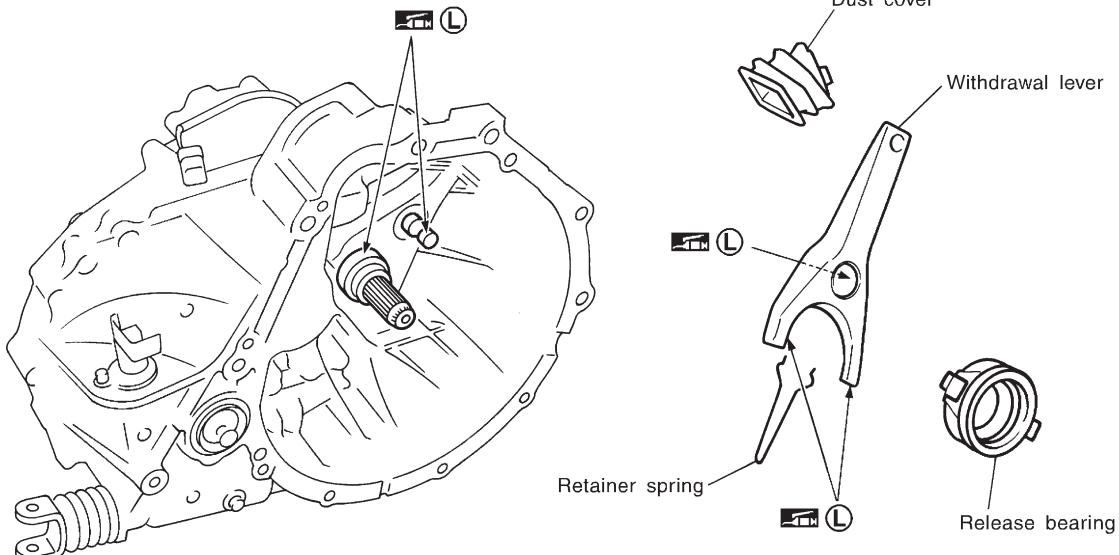
# CLUTCH RELEASE MECHANISM

Components

## Components

NFCLO027

SEC. 321

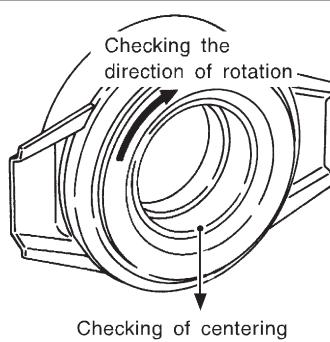


SCL814

## Removal

NFCLO028

1. Remove manual transaxle from vehicle. Refer to **MT-9**, "Removal".
2. Move withdrawal lever enough to remove release bearing, and remove release bearing from clutch withdrawal lever.
3. Remove dust cover.
4. Remove retainer spring from withdrawal lever.



SCL733

## Inspection

NFCLO029

- Replace the release bearing if it is seized, damaged, faulty in rotation direction, or has poor aligning function.
- Replace the withdrawal lever if its contact surface is worn abnormally.
- Replace the dust cover if it is deformed or cracked.

## Installation

NFCLO030

1. Apply a coat of grease to parts as instructed in the following cautions and notes before installation.

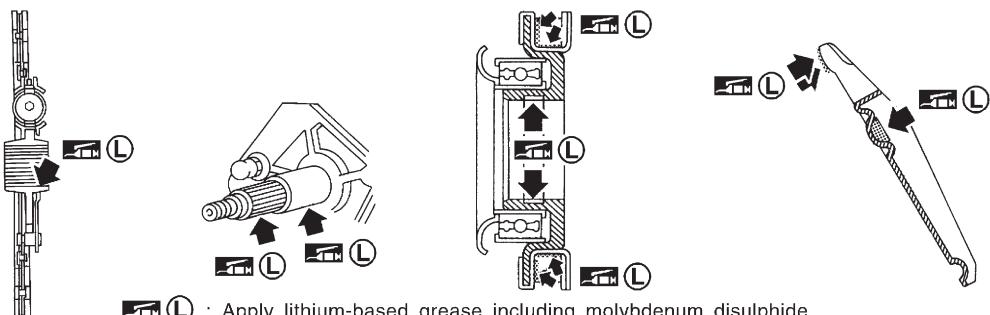
### CAUTION:

- Be sure to apply grease to the clutch components. Otherwise, abnormal noise, poor clutch disengagement, or clutch damage may occur. Wipe the excess grease off completely, because it may cause the clutch components to slip and shudder.
- Keep the clutch disc facing, pressure plate, and flywheel free of oil and grease.

## CLUTCH RELEASE MECHANISM

Installation (Cont'd)

- Clean old grease and abrasive materials off the grease application area.



■ L : Apply lithium-based grease including molybdenum disulphide.

SCL815

### NOTE:

- Equally apply a coat [approximately 1 mm (0.04 in) thick] of clutch sleeve grease to withdrawal lever and holder spring frictional surfaces.
- Apply a coat of clutch sleeve grease to the grooves on contact surfaces of the withdrawal lever ball pin and inner surface of release bearing so that grease application, make sure that grease is flush with grooves.
- Equally apply a thin coat of clutch sleeve grease to release bearing frictional surface. After grease application, install release bearing. Wipe off excess grease forced out during bearing installation. Remove release bearing.

2. Installation is in the reverse order of removal.

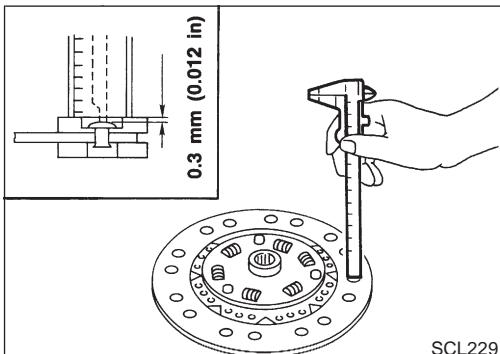
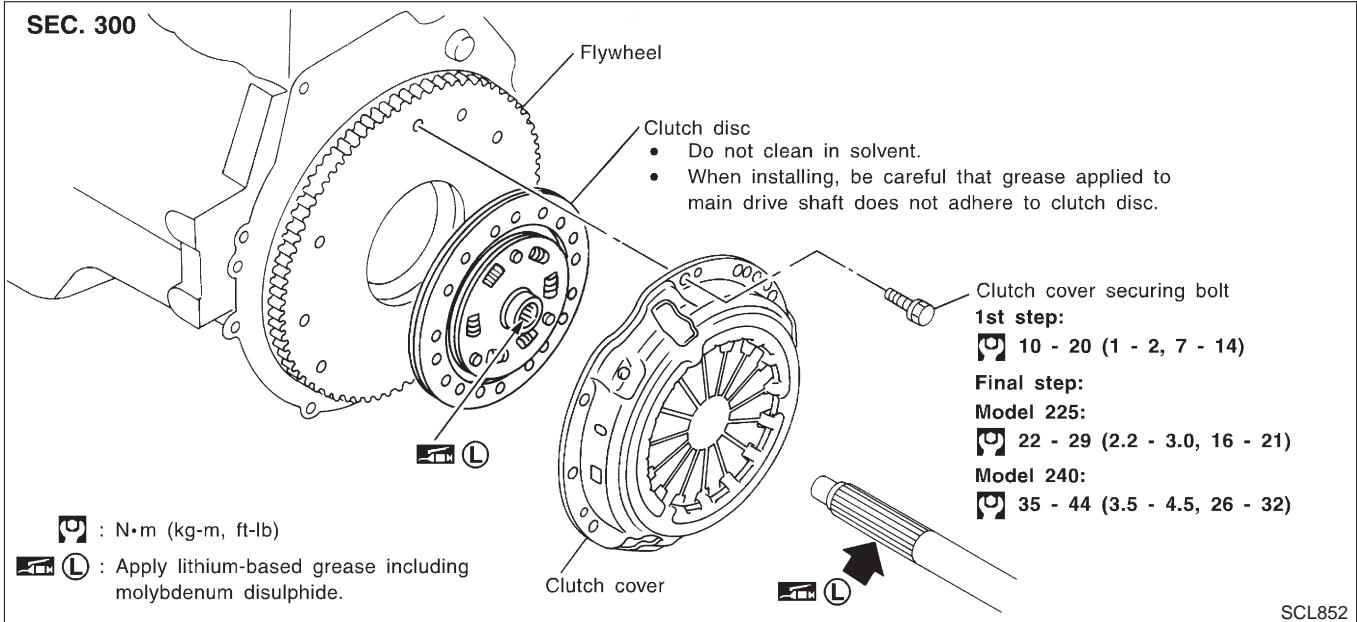
# CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

Components

## Components

NFCL0031

SEC. 300



## Inspection and Adjustment

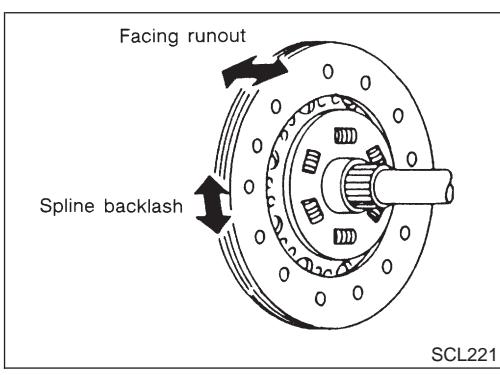
### CLUTCH DISC

NFCL0032

NFCL0032S01

- Check clutch disc for wear of facing.

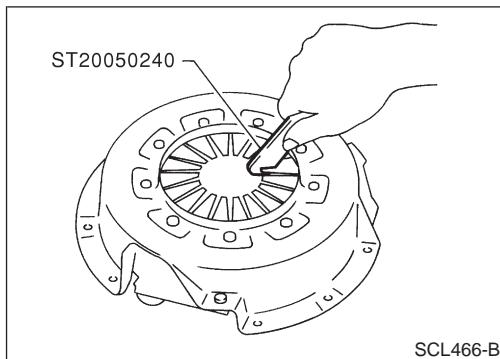
**Wear limit of facing surface to rivet head:**  
**0.3 mm (0.012 in)**



- Check clutch disc for backlash of spline and runout of facing.
  - Maximum spline backlash (at outer edge of disc):**
    - Model 225** 0.9 mm (0.035 in)
    - Model 240** 1.0 mm (0.039 in)
  - Runout limit:**  
**1.0 mm (0.039 in)**
  - Distance of runout check point (from hub center):**
    - Model 225** 107.5 mm (4.232 in)
    - Model 240** 115 mm (4.528 in)
- Check clutch disc for burns, discoloration or oil or grease leakage. Replace if necessary.

# CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

## Inspection and Adjustment (Cont'd)



### CLUTCH COVER

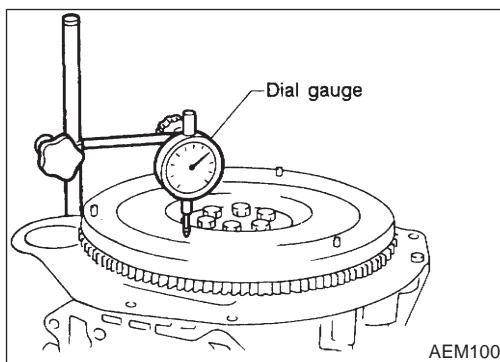
- Check clutch cover installed on vehicle for unevenness of dia-phragm spring toe height.

**Uneven limit:**

**0.7 mm (0.028 in)**

- If out of limit, adjust the height with Tool.

NFCL0032S02



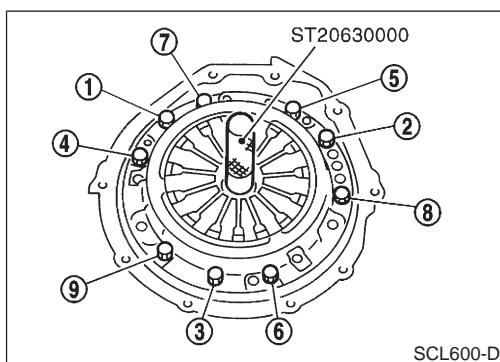
### FLYWHEEL

- Check contact surface of flywheel for slight burns or discoloration. Repair flywheel with emery paper.
- Check flywheel runout.

**Maximum allowable runout:**

**Refer to EM-68, "Flywheel/drive plate runout".**

NFCL0032S03



### Installation

- Insert Tool into clutch disc hub when installing clutch cover and disc.
- Be careful not to allow grease to contaminate clutch facing.**
- Tighten bolts in numerical order.

**First step:**

 : 10 - 20 N·m (1 - 2 kg-m, 7 - 14 ft-lb)

**Final step:**

**Model 225**

 : 22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 21 ft-lb)

**Model 240**

 : 35 - 44 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)

NFCL0033

# SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch Control System

## Clutch Control System

NFCLO034

Type of clutch control	Hydraulic
------------------------	-----------

## Clutch Master Cylinder

NFCLO035  
Unit: mm (in)

Inner diameter	15.87 (5/8)
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## Clutch Operating Cylinder

NFCLO036  
Unit: mm (in)

Inner diameter	VQ20DE model	17.46 (11/16)
	VQ30DE model	19.05 (3/4)

## Clutch Damper

NFCLO043  
Unit: mm (in)

Inner diameter	VQ20DE (LHD) model	19.05 (3/4)
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## Clutch Disc

NFCLO038

Model	225
Facing size (Outer dia. × inner dia. × thickness)	225 mm × 150 mm × 3.5 mm (8.86 in × 5.91 in × 0.138 in)
Thickness of disc assembly With load	8.0 - 8.2 mm (0.315 - 0.323 in) with 4,903 N (500 kg, 1,102 lb)
Wear limit of facing surface to rivet head	0.3 mm (0.012 in)
Facing runout limit	1.0 mm (0.039 in)
Distance of runout check point (from the hub center)	107.5 mm (4.23 in)
Maximum spline backlash (at outer edge of disc)	0.9 mm (0.035 in)

Model	240
Facing size (Outer dia. × inner dia. × thickness)	240 mm × 160 mm × 3.5 mm (9.45 in × 6.30 in × 0.138 in)
Thickness of disc assembly With load	7.9 - 8.3 mm (0.311 - 0.327 in) with 5,688 N (580 kg, 1,279 lb)
Wear limit of facing surface to rivet head	0.3 mm (0.012 in)
Facing runout limit	1.0 mm (0.039 in)
Distance of runout check point (from the hub center)	115 mm (4.53 in)
Maximum spline backlash (at outer edge of disc)	1.0 mm (0.039 in)

## Clutch Cover

NFCLO039

Model	225
Set load	5,394 N (550 kg, 1,213 lb)
Uneven limit of diaphragm spring toe height	0.7 mm (0.028 in)

Model	240
Set load	6,227 N (635 kg, 1,400 lb)
Uneven limit of diaphragm spring toe height	0.7 mm (0.028 in)

## SERVICE DATA AND SPECIFICATIONS (SDS)

Clutch Pedal

### Clutch Pedal

NFCLO040  
Unit: mm (in)

Model	LHD	RHD
Pedal height*	179.5 - 189.5 (7.07 - 7.46)	193.5 - 203.5 (7.62 - 8.01)
Pedal free play		9 - 16 (0.35 - 0.63)

\*: Measured from surface of dash reinforcement panel to surface of pedal pad.